CLAIMS

1. An anisotropic conductive film comprising:

a porous film consisting of polymer, having numerous holes penetrating in a film thickness direction, the holes being in a honeycomb arrangement and having inner wall surfaces which curve outwards;

a conductive material that fills the holes in the porous film; and

an adhesive layer coated on both surfaces of the porous film.

2. The anisotropic conductive film according to claim 1, wherein the polymer consists of one or more polymers selected from among polysulfone, polyethersulfone, polyphenylene sulfide, polyimide, polyamide-imide, siloxane-modified polyimide, siloxane-modified polyamide-imide, polyether imide and polyether ether ketone.

3. The anisotropic conductive film according to claim 1, wherein the porous film is formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent, a polymer soluble in this organic solvent and an amphiphilic material, in the atmosphere at a relative humidity of 50% or more.

4. The anisotropic conductive film according to claim 1, wherein the porous film and the conductive material are formed by leaving a supporting substrate on which

cast is a polymer solution containing at least a hydrophobic, volatile organic solvent, a polymer soluble in this organic solvent, an amphiphilic material and a conductive material, in the atmosphere at a relative humidity of 50% or more.

5. The anisotropic conductive film according to claim 3 or 4, wherein the polymer soluble in the organic solvent is one or more polymers selected from among polysulfone, polyethersulfone, polyphenylene sulfide, siloxane-modified polyimide and siloxane-modified polyamide-imide.

6. The anisotropic conductive film according to claim 1, wherein the porous film is formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent and an amphiphilic polymer, in the atmosphere at a relative humidity of 50% or more.

7. The anisotropic conductive film according to claim 1, wherein the porous film and the conductive material are formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent, an amphiphilic polymer and a conductive material, in the atmosphere at a relative humidity of 50% or more.

8. The anisotropic conductive film according to claim 6 or 7, wherein the amphiphilic polymer is a polyionic complex of a polymer having a hydrophobic group

introduced into at least one of a main chain and a side chain, with a cationic lipid.

9. The anisotropic conductive film according to claim 6 or 7, wherein the amphiphilic polymer is a polyionic complex of a polyamic acid with a cationic lipid, and the porous film is imidized after film-forming.

10. The anisotropic conductive film according to any of claims 1 to 9, wherein a diameter of the holes is smaller than the narrowest gap between plural conductors provided to connection targets, and a gap between the holes is smaller than the narrowest width of the conductors.

11. The anisotropic conductive film according to any of claims 1 to 10, wherein the conductive material consists of a group of conductive particles.

12. The anisotropic conductive film according to claim 11, wherein the conductive particles are particles of metal.

13. The anisotropic conductive film according to claim 12, wherein the metal consists of one or more metals selected from among Ag, Au, Pt, Ni, Cu and Pd.

14. The anisotropic conductive film according to claim 12 or 13, wherein a group of the metal particles filling the holes are fusion bonded by heating to be integral.

15. The anisotropic conductive film according to any of claims 1 to 14, wherein the adhesive layer is a prepreg wherein a thermosetting resin is in a semi-cured state.

16. The anisotropic conductive film according to claim 15, wherein the thermosetting resin is an epoxy resin.

17. A method of manufacturing an anisotropic conductive film, comprising the steps of:

forming a porous film consisting of polymer, having numerous holes penetrating in a film thickness direction, the holes being in a honeycomb arrangement and having inner wall surfaces which curve outwards;

filling the holes in the porous film with a conductive material; and

coating both surfaces of the porous film with an adhesive layer.

18. The method of manufacturing the anisotropic conductive film according to claim 17, wherein the porous film is formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent, a polymer soluble in this organic solvent and an amphiphilic material, in the atmosphere at a relative humidity of 50% or more.

19. The method of manufacturing the anisotropic conductive film according to claim 17, wherein the porous film is formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent and an amphiphilic polymer, in the atmosphere at a relative humidity of 50% or more.

20. A method of manufacturing an anisotropic

conductive film, comprising the steps of:

forming a porous film consisting of polymer, having numerous holes penetrating in a film thickness direction, the holes being in a honeycomb arrangement, having inner wall surfaces which curve outwards and being filled with a conductive material; and

coating both surfaces of the porous film with an adhesive layer.

21. The method of manufacturing the anisotropic conductive film according to claim 20, wherein the porous film is formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent, a polymer soluble in this organic solvent, an amphiphilic material and a conductive material, in the atmosphere at a relative humidity of 50% or more.

22. The method of manufacturing the anisotropic conductive film according to claim 20, wherein the porous film is formed by leaving a supporting substrate on which cast is a polymer solution containing at least a hydrophobic, volatile organic solvent, an amphiphilic polymer and a conductive material, in the atmosphere at a relative humidity of 50% or more.